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Welcome to Stormwater 101

**Enviroscape
Water Quality Programs
Infrastructure Programs
Development Requirements
Watershed Planning/Restoration**

Presented to the Joint City-County Planning Committee

September 11, 2008

Laura Webb Smith, Public Education Coordinator

Paul Wiebke, Assistant SW Manager



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Stormwater 101 – Water Quality Program



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Stormwater Quality Regulations

City Stormwater Pollution Control Ord.

City/County Unified Development Ord.

State Erosion and Sediment Control Prog.

State Nutrient Sensitive Waters Rules (NSW)

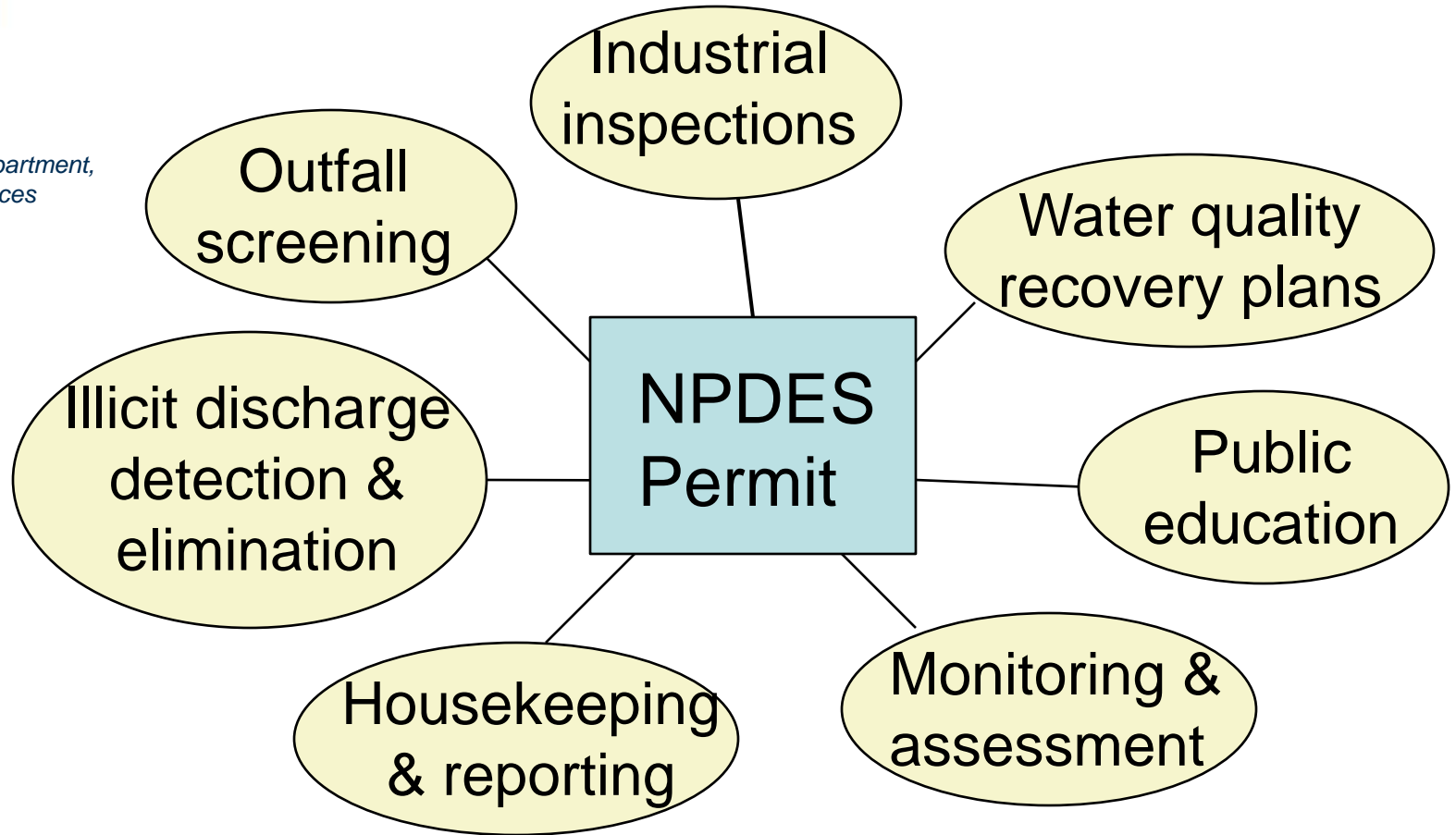
State Water Supply Watershed Program

Federal Total Maximum Daily Loads (TMDLs)

Federal National Pollutant Discharge Elimination System (NPDES) Permits – Municipal & Industry



What's required in the municipal NPDES Permit?





Stormwater pollutants

- Sewage
- Automotive fluids
- Sediment from erosion
- Car wash runoff
- Food, cooking oil, grease
- Pet waste
- Pollutants from vehicles
- Leaves & other yard wastes
- Litter
- Fertilizer, pesticides, herbicides
- Paint, solvents
- Other hazardous wastes



Illicit Connections

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Wastes that
should NOT be
directed to the
storm drain!



270

Average number
of investigations
per year

Other investigations





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Outfall Inspection & Screening

- Objectives:
 - Inspect stormwater system for maintenance
 - Identify & eliminate illicit discharges and major outfalls
- Permit requires city to inspect & maintain the MS4
- Discharges that occur during dry weather may carry pollutants
- Test for indicators of pollution



Major stormwater outfalls: 890
All MS4 outlets: 3,185
All Private outlets: 6,140

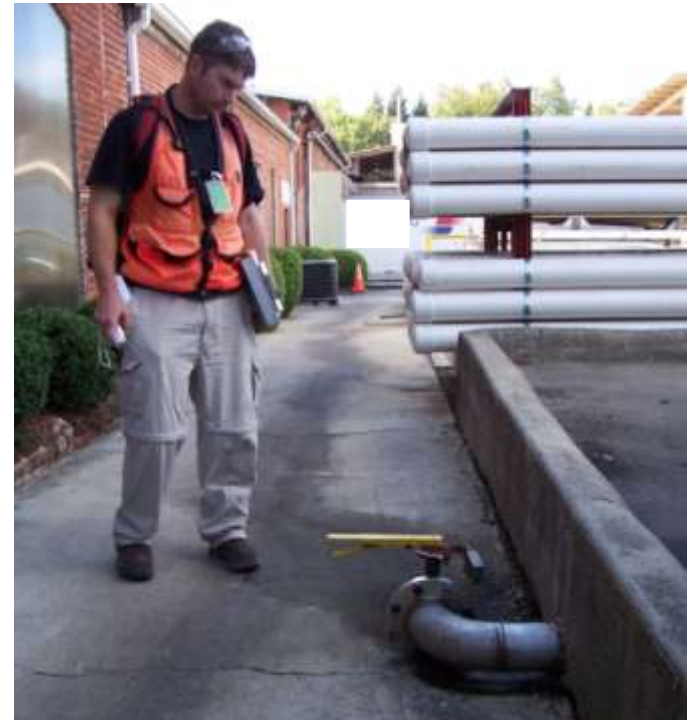


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Industrial inspections

- Inspect facilities that
 - Report environmental releases
 - Should have NPDES Industrial Permits
 - Have had prior illicit discharge enforcement
 - Are in certain categories
- Identify pollutant sources
- Implement Stormwater Pollution Prevention Plans





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City Pollution Prevention and Good Housekeeping

- Hotspot facility management
- Street sweeping
- Residential stewardship
- Employee training
- Storm drain maintenance
- Stormwater hotline response
- Street repair and maintenance
- Park and landscape maintenance
- Construction project management
- Maintain City's BMPs





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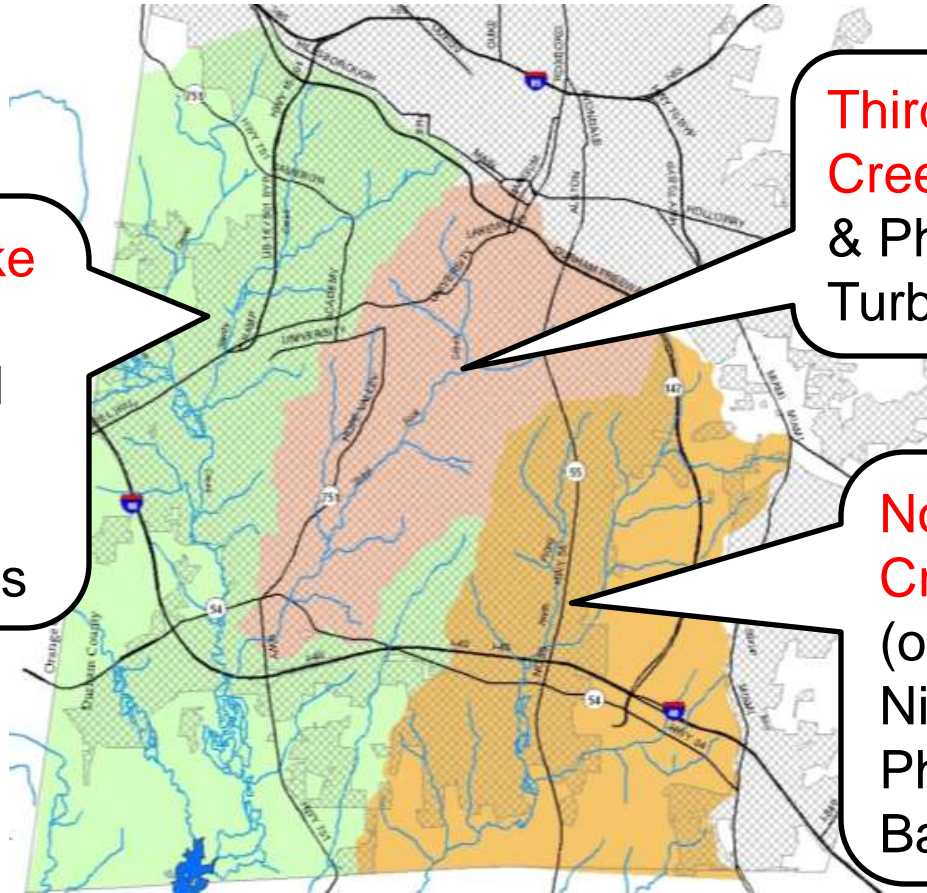


TMDLs are coming! (They're here)

Jordan Lake Watershed
(all colored areas)
Nitrogen & Phosphorus

Third Fork Creek: Nitrogen & Phosphorus, Turbidity

Northeast Creek
(orange): Nitrogen & Phosphorus, Bacteria



Water Quality Recovery Plans are required if state rules are not in place.



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Monitoring and Assessment

- Identify problem areas
- Locate potential sources
- Meeting state goals?
- Getting better or worse?

Accountability!



Chemistry - Aquatic life – Flow



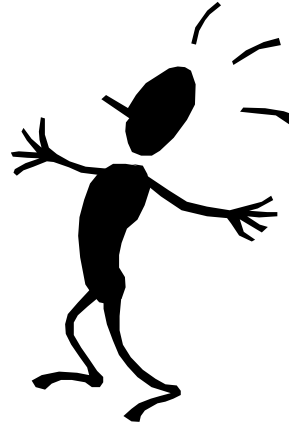
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You do the numbers...

1,250 Miles of streams and rivers

750 Miles of storm drain pipe



3,185 Stormwater outlets (Private, Public/Private, MS4)

890+ Stormwater outfalls, major

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Public Education



Eno River Festival



Bimbe

And Public Service
Announcements!
(Radio, TV, Theater)

Duke Gardens Camp



Good things are happening in Durham

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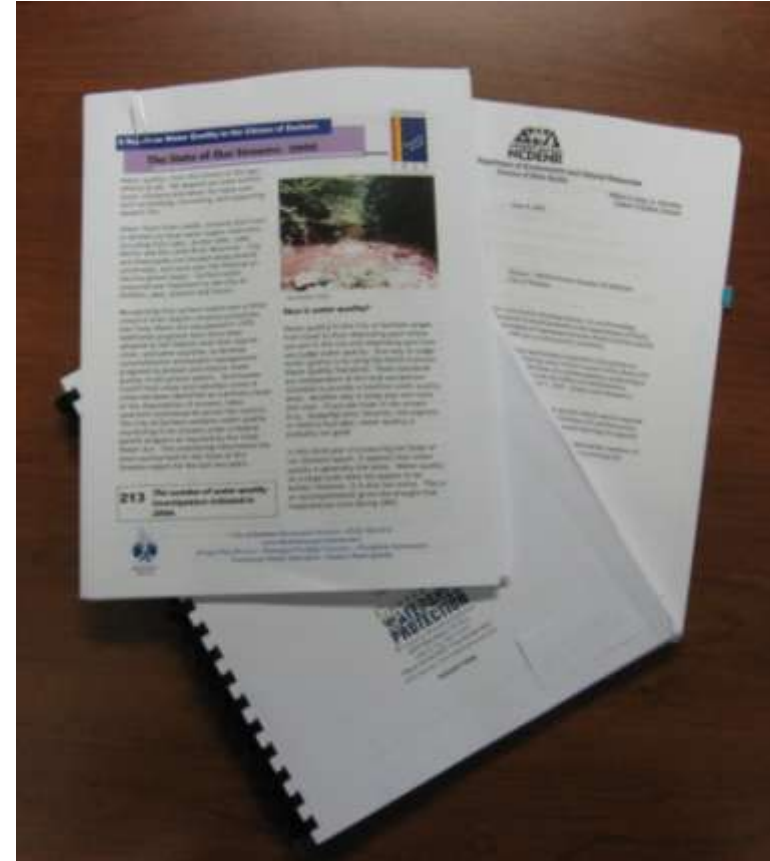
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Annual reporting

- NPDES Annual Report and Program Assessment
 - Includes information from multiple departments
 - Submitted to the state
- State of Our Streams Report

www.durhamnc.gov/stormwater



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Stormwater 101 – Infrastructure Program



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Stormwater Infrastructure Program Activities

Efforts that address the structural condition and function of an existing drainage system.

- Drainage Investigations
- Drainage Projects
- NFIP Floodplain Management
 - National Flood Insurance Program
- Special Projects
 - (Inventory, Buyout, Contract Docs, Eno Flood Warning, Ellerbe Flood Control)
- Update Stormwater Inventory



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What is a Drainage System?

Natural and constructed conveyances for collecting and transporting stormwater, whether publicly or privately owned.

- Lakes, Ponds, Rivers, Streams
- Ditches, Catch Basins/Inlets, Outlets, Pipes, Culverts





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Drainage Investigations

- Assess Conditions
- Suggest Repair Options and Provide Information
- Coordinate Repairs
- Issue NOVs



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Drainage Projects

- Engineering Analysis of Drainage Systems
- Design and Plan Preparation
- Permits and Approvals
- Contracting and Contract Management
- Project and Construction Management



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Private Property Drainage Assistance



Above: Before Construction
Upper Right: After Construction
Lower Right: Site Today

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By the Numbers –

6527

Drainage Investigations Performed

395

Drainage Assistance Requests addressed

\$4.5M

Cost of Completed Assistance Projects

\$11,500

Average Per Property Cost



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The National Flood Insurance Program

- A voluntary program between the Federal government and the local community
- Requires adopting, implementing and enforcing floodplain management ordinance
- Benefits to membership:
 - Federally-backed flood insurance
 - State and Federal disaster assistance
 - Federal loans, grants, payments, subsidies, or rebates for acquisition or construction purposes to properties in the floodplain



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NFIP Floodplain Management

- Manage the Community Map Repository
- Provide Floodplain Information to Customers
- Review/Coordinate Requests for Map Revisions
- Check Floodplain Development Permit Applications
- Technical Resource for Floodplain Administrator





Special Projects

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- Stormwater Inventory
- Fran Buyout
- Bid/Contract Documents Update
- Eno Flood Warning
- Ellerbe Flood Control Project

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Stormwater 101 – Development Requirements



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Stormwater Development Requirements

- **Peak Flow** – The rate at which water leaves site or goes into the stream?
- **Water Quality** Requirements
 - **Limiting the amount of pollutants** that leave the site or go into the stream.
 - **Stream Buffers**
- **Upcoming Rules** – What new requirements will be considered for development?



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Peak Flow (Water Quantity) Control Standards: Current Requirements

How do we control the rate of flow?

- Neuse River Basin Requirements requires a small, frequent storm (1-year) to be controlled to predevelopment conditions to help prevent stream bank erosion.
- City ordinance requires 2-year and 10-year storms to be controlled to predevelopment conditions
- 100-year floodplain regulations



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Water Quality Requirements

How do we try to keep nutrients, sediment and other pollutants out of our streams?

- Neuse River Basin Nitrogen Requirements
- Water Supply Watershed Overlay Total Suspended Solids Requirements
- Stream Buffer Requirements
-



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Stream Buffers Requirements

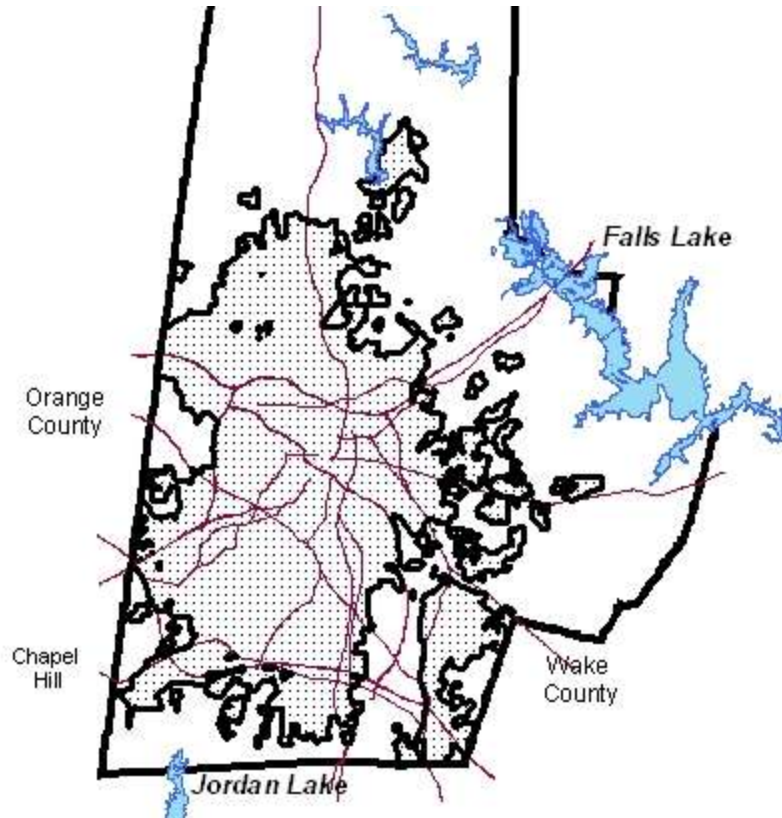
- Minimum 50' Stream Buffers Required for Intermittent and Perennial Streams. Both Cape Fear Basin and Neuse River Basin.
- Additional stream buffer requirements Water Supply Watershed, Neuse Basin Requirements.

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City of Durham before Water Quality Requirements

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Water Supply Watershed Overlay Requirements (Varies by Overlay)

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- 85% Total Suspended Solid Removal Required (usually provided by a stormwater BMP)
- Increased Stream Buffer Width Requirements

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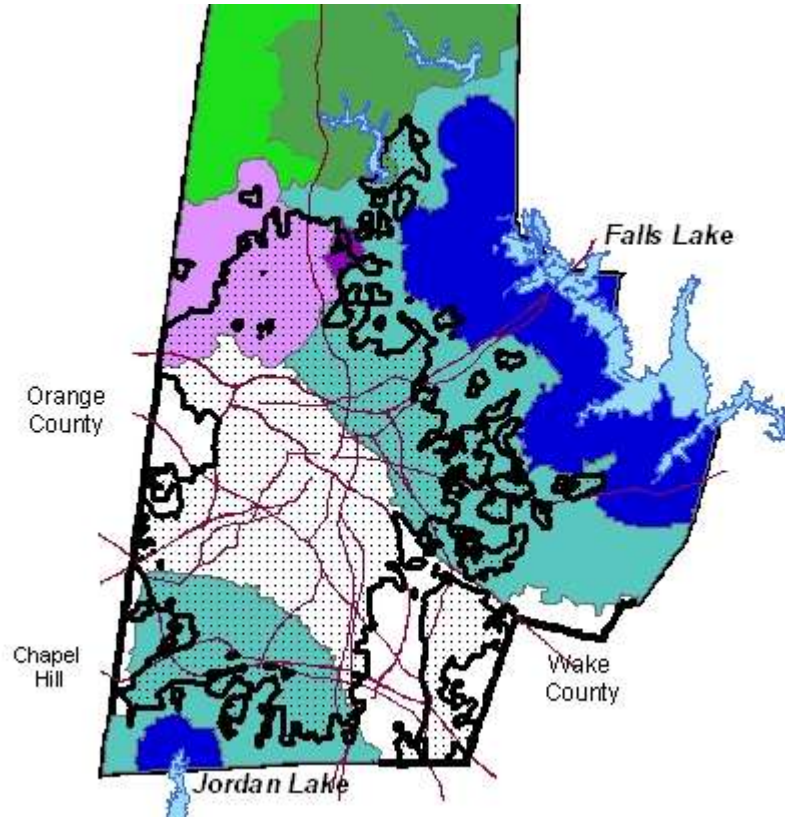
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Water Supply Overlays 1994



Water Supply Overlays

Adopted Jan 1994

Dark Green - M/LR-A 6%

Green - M/LR-B 6%

Purple – E-B 24%

Blue – F/J-A 6-9%

Light Green – F/J-B 24%

M – Lake Michie

LR - Little River
Reservoir

E – Eno River

F – Falls Lake

J – Jordan Lake



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Neuse River Basin Requirements

- Nitrogen Export Limits for development sites
- No increase in 1-year storm runoff rate at the stream buffer
- Stream Buffer Requirements

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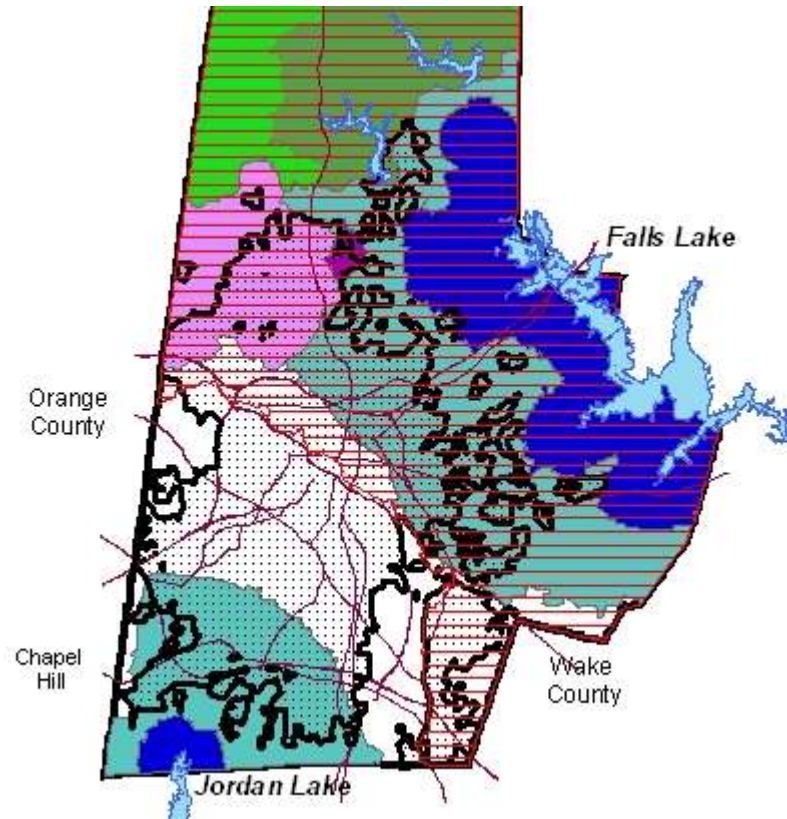
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Neuse Requirements added 2001



Water Supply Overlays

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M - Lake Michie

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E - Eno River

F - Falls Lake

J - Jordan Lake

Neuse Requirements
March 2001 - Hatching



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Upcoming Rules

How will we improve our stream quality?

- New 2007 NPDES Permit Requirements
- Jordan Lake Rules
- Falls Lake Rules
- Total Maximum Daily Loads (TMDLs) for Impaired Streams

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Stormwater 101 – Watershed Restoration and Planning



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Watershed Planning and Restoration

- Why plan for Watershed Restoration?
- What is Stormwater Services doing NOW?
- Stream Restorations in the City



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Watershed Restoration Planning

Why plan for a watershed restoration?

BMP Retrofits

Preservation

Stream Restoration

- To meet current and future requirements and restore our waterways to fishable and swimmable uses.
- Use a comprehensive approach with many tools and options to find the most effective and cost efficient solutions to water quality issues.

Low Impact Development

Volume Reduction

Maintenance Practices



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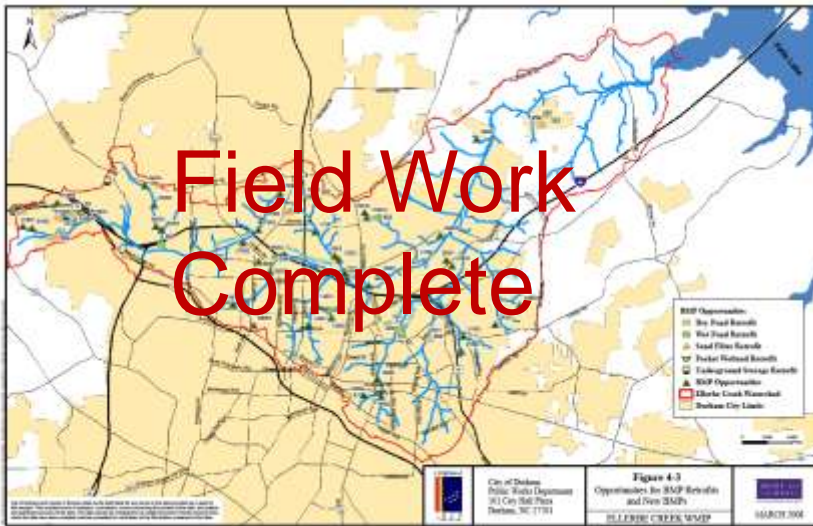
Watershed Restoration Planning NOW

What is happening NOW?

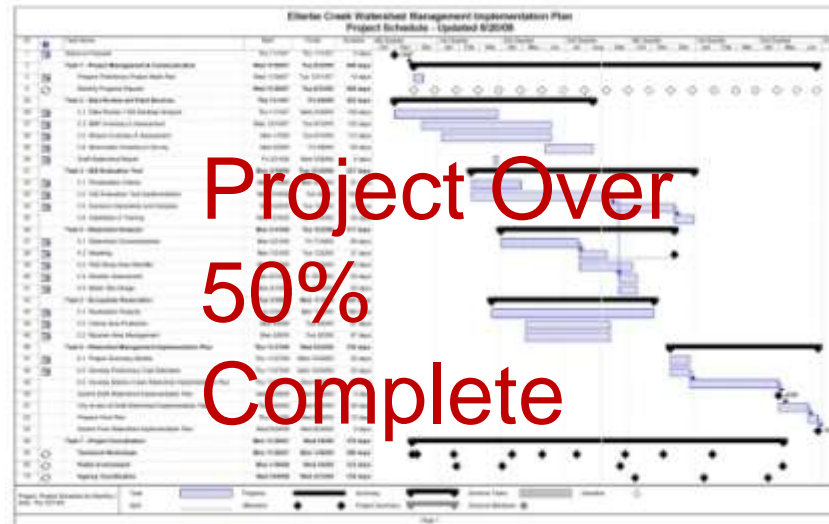
- Ellerbe Creek Watershed – completion in June 2009
- Third Fork Creek Watershed – contract negotiation
- Little Lick Creek – Complete (UNRBA)
- Lick Creek – almost Complete (UNRBA)

The Future?

- Sandy Creek
- Northeast Creek
- Stirrup Iron Creek
- And more



Ellerbe Creek Watershed Improvement Plan



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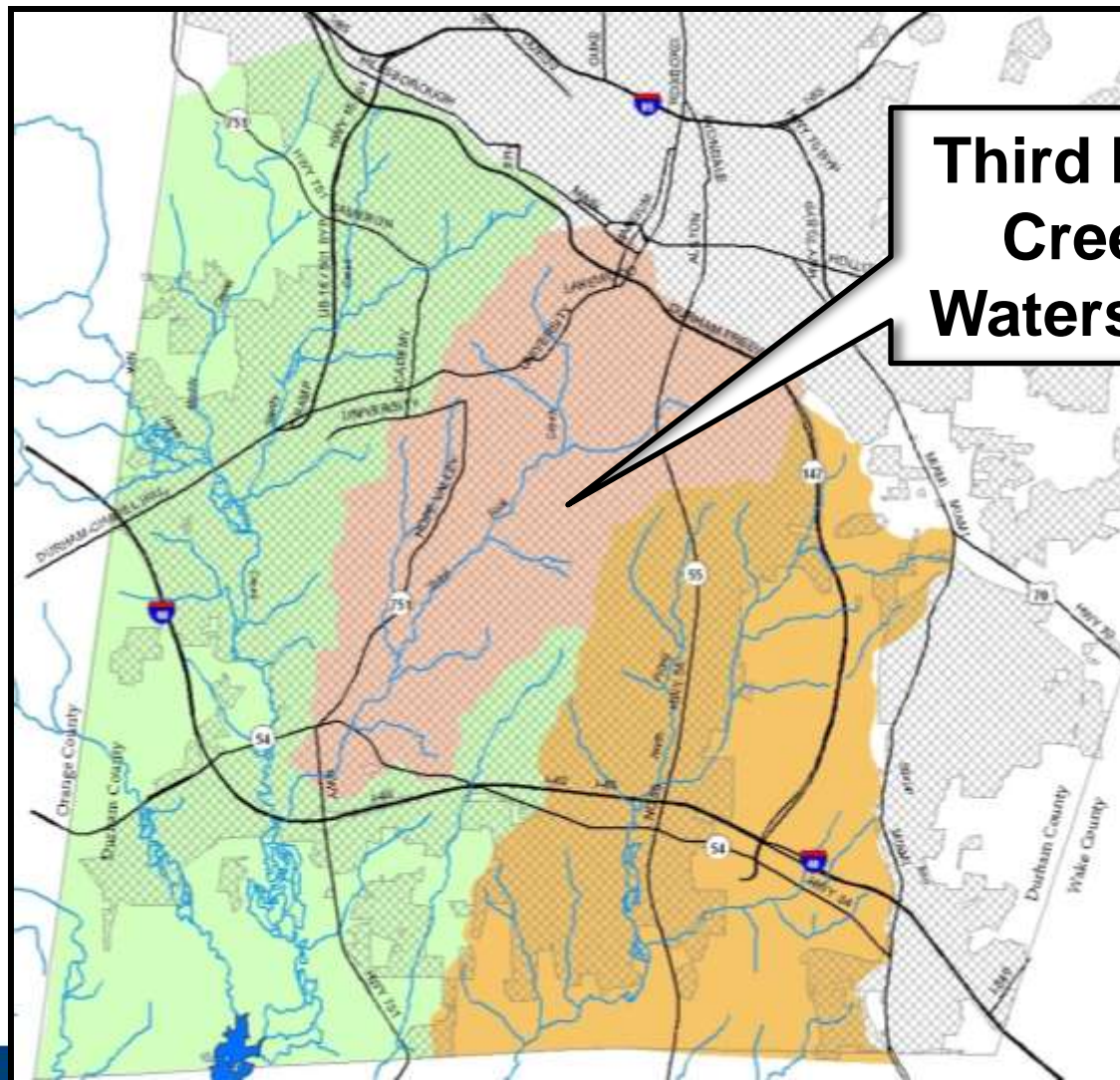
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Watershed Planning

Third Fork Creek



**Third Fork
Creek
Watershed**

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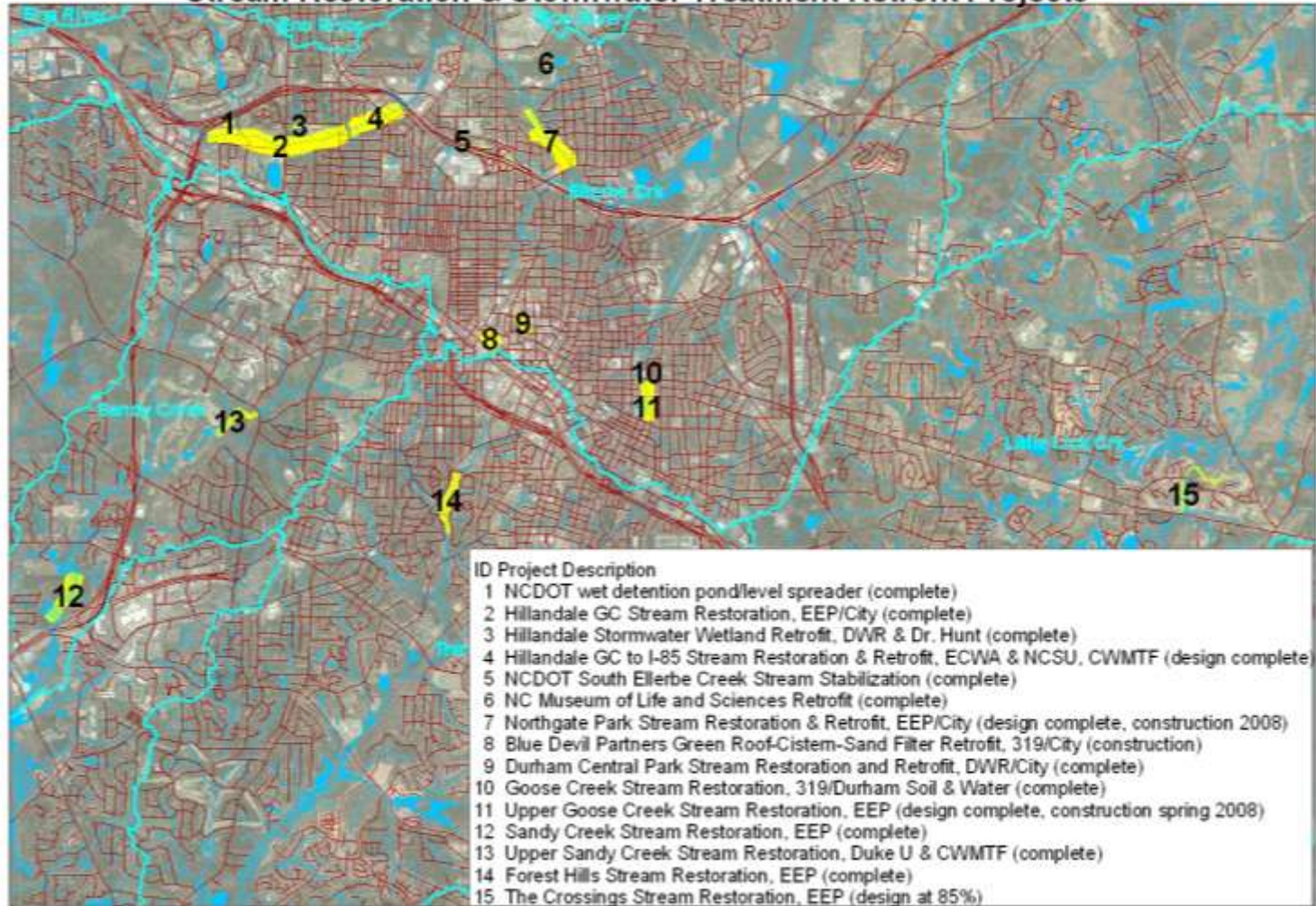
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Stream Restorations

Stream Restoration & Stormwater Treatment Retrofit Projects





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Customers and Collaborators

Internal

Mayor
City Council
City Manager's Office
Street Maintenance Division
Water Management Department
Building Inspections Department
Attorney's Office
Parks and Recreation Department
General Service Department
Community Development
Neighborhood Improvement Services
DATA
Police Department
Emergency Management Department
Keep Durham Beautiful
Com-Net
CNET
Planning Commission

Internal

NPDES Industrial Stormwater Permits:
Public Works Operations Center
Fleet Management Center
North Durham Water Reclamation Facility
South Durham Water Reclamation Facility
Sanitation Truck Wash, Solid waste
Solid Waste Transfer Station
General Services Maintenance Facility
Water & Sewer Maintenance- Water
Management Department
Neighborhood Improvement Services
Haz-Mat Team, Fire Department
City-County Emergency Management
Durham Housing Authority
Office of Public Affairs
Durham City County Planning
Environmental Affairs Board
JCCPC



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Customers and Collaborators

External

Residents

Homeowner Associations

Community Organizations

Realtors

Insurance Agents

Home Builders Association

Developers, Contractors, Engineers

Railroad Companies (CSX, Southern)

Durham County Commissioners

Durham County Soil and Erosion

Durham Soil & Water Conservation District

NC Department of Transportation

NC Division of Emergency Management

NC Floodplain Mapping Program

NC NFIP Floodplain Management Branch

External

Durham County Health Department

NC DENR, Division of Water Quality

Surface Water Protection

Division of Air Quality

Stormwater Permitting Unit

TMDL & Modeling Unit

Water Quality Standards Unit

Biological Assessment Unit

Basinwide Planning Unit

Ecosystem Enhancement Program, NCDENR

Stormwater Branch, Water Management Division,

USEPA Region IV

US Army Corps of Engineers

FEMA

HUD Housing/Affordable Housing



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Customers and Collaborators

External

Carolina Urban Water Consortium
NC Water Resources Research Institutes
Upper Neuse River Basin Association (UNRBA)
Triangle J Council of Governments (TJCOG)
Upper Cape Fear River Basin Association (UCFRB A)
UNC Institute of Government (& School of Government)
Ellerbe Creek Watershed Association
Friends of the Eno
Friends of South Ellerbe Creek
Central Park

External

North Carolina Central University
North Carolina State University
University of North Carolina, Chapel Hill
Duke University
Southeastern Water Pollution Biologist Association
Carolina Area Benthological Workshop
Clean Water Management Trust Fund
Water Resources Research Institute
Durham Public Schools
School House of Wonder
School of Math and Science
Museum of Life and Science
Duke Gardens